sought within a few days by a young man of twenty-seven who is just entering upon his second year of college work. He is willing and anxious to pursue that course which is best for him as a preparation for medical practise. He came to inquire specifically whether he ought to complete his college course and secure his bachelor's degree before entering the medical school, or should he take up the medical subjects in the combined course next year. The first alternative would defer his entrance into actual practise eight years (including one year of hospital training), at which time he will be thirty-five years of age. He is securing in the two years of preparatory college work two majors of college physics (240 hours), four majors of college chemistry (he has had one year each of physics and chemistry in high school), one major of biology, and eleven majors of work in English, mathematics, psychology, German and French, and other non-scientific subjects. Is it wise to advise this young man to defer his graduation in medicine until he is thirty-five? If he were nineteen, twenty or twenty-one, the problem would be quite a different one. At such an age he could well afford to go the whole road. In such a case the work of the last two years in college should in most cases be along lines not related to the medical curriculum but rather in the humanities, to the end that the student may become a broadly cultured, scholarly man and citizen, as well as a thoroughly trained physician. Some additional work in chemistry—quantitative analysis—and in comparative anatomy, he should have, and especially should he carry on some piece of independent investigation in order to develop the power of accurate observation and of clear logical thinking which is the most essential qualification for the practise of medicine.

Professor Christian will be glad to learn that the hope in which he indulges "that the day will soon come when the higher degrees will be awarded for medical studies just as for other university subjects," has long since been realized. The day arrived some years ago when courses in anatomy, physiology, pharmacology, bacteriology, pathology and experimental medicine were made in the most complete sense university courses, in the University of Chicago. For over five years it has been possible for the graduate students in this university to secure the doctorate degree for research in any of these departments, and several Ph.D. degrees have been so conferred. I believe the same conditions obtain at the universities of Wisconsin, Nebraska, Kansas, California and other western institutions, in which institutions such departments have been organized in the university proper, where they rightly belong.

JOHN M. DODSON

SCHOLASTIC COMPETITION

THE earnestness and enthusiasm which competition has given to athletics invites serious consideration, as to how a similar competitive spirit may be stimulated in collegiate studies. The fixed standard serves to eliminate the lazy and stupid students, and requires a certain activity of the general mass; but does nothing to make the best men put forth their full powers.

Such prizes as have generally been offered, namely, medals, books or money, do not fire the imagination of a scholar, nor make his fellows cheer him. They are seldom worthy objects of prolonged mental discipline and self-denial. Further, the basis of their award is often so one-sided as to diminish their value in the eyes of students. It is power which should be stimulated and rewarded rather than a cut-and-dried record.

The value of the moments of great dramatic action in athletics has been recognized and is used as a stimulus for the prolonged and tedious training. From the nature of scholastic studies, these dramatic moments are fewer, but should therefore be made much of and multiplied where possible.

In a very few colleges there is a class of rewards which really stimulate the best scholars and enthuse their fellow students. While varying in different institutions and departments, they are always opportunities for widening the experience and increasing the knowledge of the successful competitors. I

refer especially to the expeditions sent out for collecting and study; a two-months' trip from a Massachusetts college to Cuba to make a geological collection, or from an Ohio college to the Maine coast for an anthropological collection, offers two or three of the best men an opportunity for broadening experience and further first-hand study; which is a fit reward for excellency in geology or archeology; and the men respond to it.

Of necessity the plans of such an expedition, when they are to serve as a stimulus to scholarship, must be carefully thought through. The membership must be limited to men who have earned the right. The field should be distant enough to be a new experience. The objects of the expedition must be broad enough to interest not only those who go, but their fellow students. The manner of life should be as untrammeled as practicable, camping if possible. In general, research work would be too technical for the main object of such an expedition; but it is rare indeed that two months of active work by a party of three or four fails to bring to light some new form, or make some concrete contribution to knowledge. And it is this possibility, like the vein of gold to the prospector, which urges the men ever on; and upon their return, it is the account of this success which brings the cheers of their fellows. This last is a very important part of an expedition, being the dramatic moment which completes the trip.

While such natural sciences as anthropology, biology, botany, geology and zoology most easily lend themselves to expeditions, other departments like economics, physics, chemistry, etc., can use them for study and accumulation of data if not for collecting. Languages and mathematics will find methods along different lines. But I believe that in all cases the prize which will stimulate the best scholastic work is to offer the successful competitors a broader opportunity, and an experience which will probably not come to him again in later life. It is a taste of the fruit which mature work in his field offers.

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Historical Graphics

To the Editor of Science: The two recent letters in Science with the above title suggest the hope that many other teachers are presenting the personal and historical sides of their subjects along with the scientific and formal parts, and are using charts like those described. It would be well worth the time needed, to require students to make such charts for different subjects, suitable brief lists of names with dates being furnished them and proper scales being suggested. It is obvious that where it is important to note contemporary lives—as in studying Italian art, or the wars between England and France, or between the kings of Judah and Israel—such charts are practically indispensable. If it is desired to unite in one chart both duration, as of lives, and dates of events, it is sometimes better to put the time in a vertical column.

But do not let it be overlooked that we owe this ingenious device to the famous Dr. Joseph Priestley, F.R.S., the chemist, historian, political writer and theologian. In 1765 he published "A Chart of Biography" which ran through many editions, including one at Philadelphia in 1803. A similar idea was utilized in "A New Chart of History" in 1770, of which a fifteenth edition appeared in 1816. His "Lectures on History," 1788, and several times reprinted, are accompanied by a small specimen of each chart. In one place he says:

> The state of the world with respect to persons . . . may be exhibited with ease and advantage by means of *lines* and *spaces*. . . . Our idea of *time* is always that of a *line*.

The advantages are set forth at length. His original chart covered the period 1200 B.C. to about 1750 A.D. and had 2,000 names divided into classes, with dates and areas; durations that were certain were represented by full lines; uncertain periods by dotted lines. These principles were clearly applied in the "Biographical Chart" with fifty names prefixed to his voluminous "History and Present State of Vision, Light and Colors," 1772.

As Americans we have a special interest in the man, because of his association with Ben-